DOCUMENT RESUME

ED 370 367 FL 022 093

AUTHOR Boronow, Yvette
TITLE Bilingual Education through Architectural Mathematics (Project BEAM), Community School District 7. Final Evaluation Report, 1992-93. OREA Report.
INSTITUTION New York City Board of Education, Brooklyn, NY. Office of Research, Evaluation, and Assessment.
SPONS AGENCY Department of Education, Washington, DC.
PUB DATE 13 Sep 93
CONTRACT T003A90275
NOTE 42p.; For the 1991-92 report, see ED 359 804.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Architecture; Attendance Patterns; *Bilingual Education Programs; Curriculum Development; Elementary Education; *English (Second Language); Inservice Teacher Education; Intensive Language Courses; Limited English Speaking; *Mathematics Instruction; *Native Language Instruction; Parent Participation; Program Evaluation; Second Language Instruction; Spanish Speaking; Staff Development; Student Attitudes
IDENTIFIERS New York City Board of Education; *Project BEAM NY

ABSTRACT

Bilingual Education through Architectural Mathematics (Project BEAM) is a federally-funded program in its fourth year of operation in 1992-93. It served 226 limited-English-proficient Spanish-speaking students in two Bronx (New York) elementary schools. Students received instruction in English as a second language (ESL), native language arts (NLA), and mathematics through study of architecture. Parent involvement and staff development activities were also important program components. The program met its objectives for mathematics achievement, curriculum development, parent involvement, and student knowledge of and appreciation for architecture. While it met staff development objectives for instructional use of architecture and staff participation in workshops and conferences, it did not meet a staff development objective for enrollment in college courses. It did not meet objectives for ESL, NLA, or attendance. Recommendations for program improvement include: assessing reasons for lack of ESL achievement; considering intensive ESL literacy instruction, particularly for recent immigrants; exploring techniques to increase mathematics and NLA skills, possibly through peer tutoring and enrichment programming; reviewing the attendance objective; and encouraging project teachers to enroll in colleg courses. (Author/MSE)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 370 367

OREA Report

Bilingual Education Through Architectural Mathematics
(Project BEAM)
Community School District 7
Transitional Bilingual Education Grant T003A90275
FINAL EVALUATION REPORT
1992-93

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Robert Tobias
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

FL022093

BEST COPY AVAILABLE

Bilingual Education Through Architectural Mathematics
(Project BEAM)
Community School District 7
Transitional Bilingual Education Grant T003A90275
FINAL EVALUATION REPORT
1992-93

Ms. Yvette Boronow, Project Director
Community School District 7
501 Cortlandt Avenue
Bronx, NY 10451
(718) 292-0481

NEW YORK CITY BOARD OF EDUCATION

Carol A. Gresser
President

Irene H. Impellizzeri
Vice President

Victor Gotbaum
Michael J. Petrides
Luis O. Reyes
Ninfa Segarra-Vélez
Dennis M. Walcott
Members

Andrea Schlesinger
Student Advisory Member

Ramon C. Cortines
Chancellor

9/13/93

It is the policy of the New York City Board of Education not to discriminate on the basis of race, color, creed, religion, national origin, age, handicapping condition, marital status, sexual orientation, or sex in its educational programs, activities, and employment policies, and to maintain an environment free of sexual harassment, as required by law. Inquiries regarding compliance with appropriate laws may be directed to Mercedes A. Nesfield, Director, Office of Equal Opportunity, 110 Livingston Street, Room 601, Brooklyn, New York 11201, Telephone: (718) 935-3320.

BEST COPY AVAILABLE

EXECUTIVE SUMMARY

Bilingual Education Through Architectural Mathematics (Project BEAM), an Elementary and Secondary Education Act (E.S.E.A.) Title VII-funded project, was in its fourth year of operation at P.S. 49 and P.S. 146 in Community School District (C.S.D.) 7, in the Bronx. In the year under review, Project BEAM served a total of 226 Spanish-speaking students who scored at or below the 40th percentile on the Language Assessment Battery (LAB) and thus were categorized as being of limited English proficiency (LEP). Five English proficient (EP) students (two percent) who would benefit from the program were also admitted. Participating students received instruction in English as a second language, native language arts, and mathematics. Parental involvement and staff development were designed to be an integral part of this project.

Teachers of participating students had the opportunity to attend periodic staff meetings and conferences. The project also reimbursed tuition for staff members taking courses at the college level.

Project BEAM had an active parental component which included educational field trips, workshops, and activities. The project also hired consultants to train staff in architectural concepts in mathematics and their application to hands-on activities and demonstration lessons.

Project BEAM met its objectives for mathematics, curriculum development, parental involvement, and knowledge of and appreciation for architecture. While the project met its staff development objectives for instructional use of architecture and staff participation in workshops and conferences, it failed to meet its staff development objective for enrollment in university courses. The project did not meet its objectives for English as a second language (E.S.L.), native language arts (N.L.A.), or attendance.

The conclusions, based on the findings of this evaluation, lead to the following recommendations to the project:

- Assess reasons for the lack of growth in participants' English language skills. Consider offering intensive E.S.L. at the literacy level, particularly for recent immigrants.
- Explore additional techniques to increase students' acquisition of skills in mathematics and N.L.A., possibly by expanding peer tutoring and enrichment programming.
- Review the attendance objective. Consider requesting modification of the objective so that a comparison between project and mainstream students is made.
- Encourage project teachers to enroll in university courses.

ACKNOWLEDGMENTS

This report has been prepared by the Bilingual, Multicultural, and Early Childhood Evaluation Unit of the Office of Educational Research. Thanks are due to Mr. Marc A. Augustin for collecting the data and writing the report.

Additional copies of this report are available from:

Dr. Tomi Deutsch Berney
Office of Educational Research
Board of Education of the City of New York
110 Livingston Street, Room 732
Brooklyn, NY 11201
(718) 935-3790 FAX (718) 935-5490

TABLE OF CONTENTS

		PAGE
I.	INTRODUCTION	1
	Project Context	1
	Students' Characteristics	2
	Project Objectives	4
	Project Implementation	5
	Parent and Community Involvement Activities	9
II.	EVALUATION METHODOLOGY	10
	Evaluation Design	10
	Instruments of Measurement	11
	Data Collection and Analysis	12
III.	FINDINGS	15
	Participants' Educational Progress	15
	Former Participants' Academic Progress in English Language Classrooms	20
	Overall Educational Progress Achieved Through Project	22
	Case History	23
	Staff Development Outcomes	24
	Curriculum Development Outcomes	25
	Parental Involvement Outcomes	25
IV.	SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	27
	Achievement of Objectives	27
	Most and Least Effective Components	28
	Recommendations to Enhance Project Effectiveness	28
	APPENDIX A Instructional Materials	29
	APPENDIX B Class Schedules	31

LIST OF TABLES

		PAGE
TABLE 1	Number of Students in Project BEAM, by Grade	2
TABLE 2	Students' Countries of Origin	3
TABLE 3	Project Staff Qualifications	7
TABLE 4	Qualifications of Non-Title VII Staff	8
TABLE 5	Pretest/Posttest N.C.E. Differences on the Language Assessment Battery (LAB), by Site	16
TABLE 6	Pretest/Posttest N.C.E. Differences on El Examen de Lectura en Español (ELE), by Site	18
TABLE 7	Pretest/Posttest N.C.E. Differences on the Metropolitan Achievement Test in Mathematics (MAT-Math) and the California Achievement Test (CAT), by Site	21

I. INTRODUCTION

In 1992-93, Bilingual Education through Architectural Mathematics (Project BEAM) was in its fourth year of funding as an Elementary and Secondary Education Act (E.S.E.A.) Title VII project.

PROJECT CONTEXT

Project BEAM operated at P.S. 49 and P.S. 156 in Community School District (C.S.D.) 7 in the Bronx. The student population in C.S.D. 7 was 67 percent Latino, 32 percent African-American, and 1 percent European- and Asian-American. Most students (over 90 percent) came from low-income families, as indicated by their eligibility for the free-lunch program.

Composition of the student body at P.S. 49 for the year under review was similar to that of the district. Of 686 students, 60.1 percent were Latino, 39.5 percent were African-American, and 0.4 percent were European- or Asian-American, or Native American. Of these students, 28 percent (189) of the total number were of limited English proficiency (LEP), and 98 percent came from low-income families.

Of the 848 students at P.S. 156, 58 percent were Latino, 41 percent African-American, and 1 percent were European- or Asian-American, or Native American. Ninety-five percent of these students came from low-income families, and 17 percent were LEP.

Constructed in 1965 and 1972 respectively, P.S. 49 and P.S. 156 occupied relatively new buildings. Classrooms at both sites were clean and brightly lit.

Students' writings and art decorated the walls. Architectural projects were on display in resource rooms. Bulletin boards in the well-lit halls were colorful and topical.

STUDENT CHARACTERISTICS

Project BEAM served a total of 226 Spanish-speaking students in first to fifth grade. (See Table 1.) Ninety-eight percent were LEP students. LEP status was determined by Language Assessment Battery (LAB) scores at or below the 40th percentile. The remainder were English proficient (EP). Male students numbered 116 (51.3 percent) and female 110 (48.7 percent).

TABLE 1

Number of Students in Project BEAM, by Grade

Site	1	2	3	4	5	Total
P.S. 49		33	27	23	32	115
P.S. 156	2	39	26	21	23	111
Total	2	72	53	44	55	226

A majority of the participants (52.7 percent) were born in the United States; for a complete list of countries of origin see Table 2. Students who had immigrated to this country had from one to three years of schooling in their native country. All project students came from low-income families and were eligible for the free-lunch program.

TABLE 2

Students' Countries of Origin

Country	Number of Students
United States	119
Dominican Republic	44
Puerto Rico	28
Mexico	21
Honduras	6
Ecuador	3
Guatemala	3
Colombia	1
Venezuela	1
TOTAL	226

Needs Assessment

Before instituting Project BEAM, C.S.D. 7 conducted an exhaustive needs assessment of the targeted students, their families, and the educational staff who were to serve them. The data obtained from this assessment indicated needs in three primary areas: (1) intensive language instruction and support services to improve LEP students' school performance; (2) staff development activities and conferences for teachers; and (3) workshops for parents.

PROJECT OBJECTIVES

Student Objectives

- By June 1993, participating students will demonstrate significant English language gains in listening, speaking, reading, and writing, as shown by gains of at least 5 N.C.E.s on the Language Assessment Battery (LAB).

- By June 1993, participating students will demonstrate gains in Spanish Reading skills by showing significant pretest/posttest gains on El Examen de Lectura en Español (ELE).

- By June 1993, as a result of participating in the program, students will demonstrate achievement beyond expectation as shown by gains of at least 5 N.C.E.s on the Metropolitan Achievement Test in mathematics (MAT-Math).

- By June 1993, 80 percent of the participating students will show knowledge and appreciation of various architectural concepts and techniques.

- As a result of participating in the program, there will be a significant gain in student attendance.

Staff Development Objectives

- Participating teachers will demonstrate a greater ability to use various forms of architecture in their E.S.L. and Spanish reading instruction.

- Sixty percent of program teachers will have enrolled in at least one university course each semester.

- Sixty percent of program teachers will have participated in teacher training workshops and conferences.

Curriculum Development

- A draft of a manual containing learning activities and methods to be used for E.S.L./Spanish reading will be prepared by the participating staff and teachers.

Parental Involvement Objectives

- Sixty percent of the parents of participating students will have participated in program-related activities.
- Sixty percent of the parents will have participated in E.S.L. and Spanish reading through architectural mathematics activities.

PROJECT IMPLEMENTATION

During the 1992-93 school year, Project BEAM provided instructional and support services to 226 Spanish-speaking LEP and EP students and their families. The project's main goal was to promote the acquisition of English language skills. To meet this goal, the project used bilingual instructional methodologies, including content-based materials and second language development activities. The content area courses were taught at the beginning level entirely in Spanish and at the more advanced levels with an E.S.L. methodology.

Project BEAM used architecture as a vehicle to motivate instruction. Two licensed architects were contracted through Learning Through an Expanded Arts Program (LEAP). They provided ten workshop sessions on architectural concepts in mathematics and their application to hands-on activities and demonstration lessons.

Project BEAM also provided multicultural activities to foster awareness of the students' own and other cultures. The project offered parental involvement and staff development activities that included workshops and reimbursement for college credits.

The project director reported that in the year under review the project held an exhibit of students' work at the Bronx Museum of Art. Students also had the opportunity to show their school projects to the community.

The project offered activities to acquaint students with a number of cultural resources around the city. These included trips to the American Museum of Natural History, the Museum of the City of New York, El Museo del Barrio, the Big Apple Circus, and Green Meadows Farm.

During the year under review, Project BEAM had meetings and workshops describing the project's philosophy, goals, and designs. Both parents and school staff were involved.

Materials, Methods, and Techniques

Content area classes were taught in Spanish at beginning levels and progressed to English with an E.S.L methodology at advanced levels.

A wide array of strategies and techniques were used for instruction, including cooperative learning groups, peer tutoring, singing, story mapping, dramatization, and whole language learning.

For a list of instructional materials used in the project, see Appendix A.

Capacity Building

C.S.D. 7 has been contributing continuously to the funding of the project and is planning to take it over when Title VII funding ends.

Staff Qualifications

Title VII staff. The project's Title VII staff included the project director and two resource teachers. See Table 3 for a description of degrees held and language proficiencies (communicative or teaching*).

TABLE 3

Project Staff Qualifications

Position Title	Degree(s)	Language Competence
Project Director	M.A., P.D.	Spanish TP
Resource Teacher	M.A.	Spanish TP
Resource Teacher	M.S.	Spanish TP

The project director was a native speaker of Spanish and had more than 13 years' experience in the field of teaching LEP students. Her responsibilities included the supervision and coordination of activities, staff selection and training, and providing OREA with the required information for the project's evaluation.

Both resource teachers were also native speakers of Spanish and had over five years of experience in the field. They assisted classroom teachers in the development and implementation of instructional activities, provided in-service

*Communicative proficiency (CP) is defined as a non-native speaker's basic ability to communicate and interact with students in their native language. Teaching proficiency (TP) is defined as the ability to use LEP students' native language in teaching language arts or other academic subjects.

activities and training to parents and teachers of participating students, and selected instructional materials.

Other staff. Ten teachers and two outside consultants served the project. See Table 4 for degrees, certifications, and language proficiencies of the teachers.

TABLE 4

Qualifications of Non-Title VII Staff

Teachers	Degree(s)	Certificate(s) License(s)	Language Competence
10	Master's 4 Bachelor's 6	Bil. Common Branches 7 P.P.T. 2 C.P.T. 1	Spanish TP 8, CP 2

The teachers had one to ten years of experience in teaching LEP students. Except for two provisional teachers, all teachers were certified in the areas in which they taught.

Consultants. Two licensed architects contracted through LEAP were used as consultants and instructed both teachers and students.

Staff Development

Teachers of participating students attended a series of monthly and/or weekly activities sponsored by the C.S.D.'s bilingual offices. They also attended mandated districtwide workshops. These workshops focused on Spanish-language and E.S.L. activities in a dual language curriculum. Teachers received tuition assistance toward college-level courses in bilingual education.

Instructional Time Spent on Particular Tasks

See Appendix B for examples of class schedules.

Length of Time Participants Received Instruction

Students had a mean of 2.0 years (s.d.=0.6) of education in a non-English-speaking school system and 3.0 years (s.d.=2.8) of education in the United States. The median amount of time students participated in Project BEAM was 16 months.

Activities to Improve Pre-Referral Evaluation Procedures for Exceptional Students

Students who were thought to be in need of special education were referred to the School-Based Support Team (S.B.S.T.) for evaluation. The S.B.S.T. at P.S. 49 included two members who were fluent in Spanish and familiar with Spanish-language assessment instruments. At P.S. 156, the S.B.S.T. had no members bilingual in Spanish, and other staff translated as necessary.

Gifted and talented students were identified by teacher judgment and received individualized tutoring.

PARENT AND COMMUNITY INVOLVEMENT ACTIVITIES

The project sponsored a wide variety of parental and community involvement activities that included weekly workshops, field trips, and an art exhibit.

II. EVALUATION METHODOLOGY

EVALUATION DESIGN

Project Group's Educational Progress as Compared to That of an Appropriate Non-Project Group

OREA used a gap reduction design to evaluate the effect of language instruction on project students's performance on standardized tests. Because of the difficulty in finding a valid comparison group, OREA used instead the groups on which the tests were normed. Test scores are reported in Normal Curve Equivalents (N.C.E.s), which are normalized standard scores with a mean of 50 and a standard deviation of 21.1. It is assumed that the norm group has a zero gain in N.C.E.s in the absence of supplementary instruction and that participating students' gains are attributable to project services.

Applicability of Conclusions to All Persons Served by Project

Data were collected from all participating students for whom there were pre-test and posttest scores. (There were no pretest data on students who entered the program late; therefore, posttest data for them will serve as pretest data for the following year.) Instruments used to measure educational progress were appropriate for the students involved. The LAB, El Examen de Lectura en Español (ELE), and the Metropolitan Achievement Test for Mathematics (replaced by the California Achievement Test [CAT] in spring 1993) are used throughout New York city to assess the growth of English, Spanish, and mathematics skills in populations similar to those served by Project BEAM.

INSTRUMENTS OF MEASUREMENT

OREA compared pre- and posttest scores on the LAB to assess the E.S.L. objective and the ELE to assess the N.L.A. objective. To assess the mathematics objective, OREA compared pretest scores on the MAT-Math and posttest scores on the Concepts and Applications subtest of the CAT.

All students were tested at the appropriate grade level. The language of the LAB and ELE was determined by the test itself, whereas the language of the MAT-Math and Math Concepts and Applications subtest of the CAT was determined by the language in which the student received instruction in mathematics.

According to the publishers' test manuals, all standardized tests used to gauge project students' progress are valid and reliable. Evidence supporting both content and construct validity is available for the LAB. Content validity is confirmed by an item-objective match and includes grade-by-grade item difficulties, correlations between subtests, and the relationship between the performance of students who are native speakers of English and students who are LEP. To support reliability, the Kuder-Richardson Formula 20 (KR20) coefficients and standard errors of measurement (SEM) are reported by grade and by form for each subtest and total test. Grade reliability coefficients, based on LEP students on the English version, ranged from .88 to .96 for individual subtests and from .95 to .98 for the total test.

The ELE was prepared by New York City educators who were native speakers of Spanish and represented several Latino linguistic and cultural groups. The ELE was administered in two forms to all New York City students who were receiving

language arts instruction in Spanish. For form 1, the grade reliability coefficients ranged from .94 to .96. Comparable data for form 2 will be generated as soon as possible after its administration in the spring of 1993. Items on the test were grade-specific. Construct validity is evidenced by grade-to-grade decreases in item difficulty within level. This characteristic reflects the acquisition of increased amounts of the underlying construct (reading proficiency) as students progress through the grades.

For the Math Concepts and Applications Subtest of the CAT, content validity was determined by comparing the content descriptions and the test items with particular curriculum objectives. The KR20 was used as a measure of internal consistency. The SEM is also reported in order to indicate the range within which students' true scores are likely to fall. For the Math Concepts and Applications subtest given in second through eighth grade, the number of items ranged from 42 to 50. KR20 coefficients ranged from 0.88 to 0.91; SEM ranged from 2.55 to 3.09 raw score units.

To assess the objective for architecture, OREA used final course grades.

DATA COLLECTION AND ANALYSIS

Data Collection

To gather qualitative data, an OREA evaluation consultant carried out on-site and telephone interviews of the project director several times during the school year and also observed two classes on each of two visits. The project evaluator collected the data and prepared the final evaluation report in accordance with the New York State E.S.E.A. Title VII Bilingual Education Final Evaluation Report format, which was

adapted from a checklist developed by the staff of the Evaluation Assistance Center (EAC) East in consultation with the Office of Bilingual Education and Minority Language Affairs (OBEMLA).

Proper Administration of Instruments

Qualified personnel received training in testing procedures and administered the tests. Test administrators followed guidelines set forth in the manuals accompanying standardized tests. Time limits for subtests were adhered to; directions were given exactly as presented in the manual.

Testing at twelve-month testing intervals.

Standardized tests were given at 12-month intervals, following published norming dates.

Data Analysis

Accurate scoring and transcription of results. Scoring, score conversions, and data processing were carried out by the Scan Center of the Board of Education of the City of New York. Data provided by the Scan Center were analyzed in the Bilingual, Multicultural, and Early Childhood Evaluation Unit of OREA. Data Collectors, processors, and analysts were unbiased and had no vested interest in the success of the project.

Use of analyses and reporting procedures appropriate for obtained data. To assess the significance of students' achievement in English, Spanish, and mathematics, OREA computed a correlated *t*-test on the LAB, ELE, and MAT/CAT-Math N.C.E. scores. The *t*-test determined whether the difference between the pre-

and posttest scores was significantly greater than would be expected from chance variation alone.

The only possible threat to the validity of any of the above instruments might be that LAB norms were based on the performance of English proficient (EP) rather than LEP students. Since OREA was examining gains, however, this threat was inconsequential—the choice of norming groups should not affect the existence of gains.

III. FINDINGS

PARTICIPANTS' EDUCATIONAL PROGRESS

Project BEAM carried out all instructional activities specified in its original design. Throughout the school year, students had ample opportunity to develop their English and native language skills.

LEP Participants' Progress in English

An OREA field consultant observed a third grade E.S.L. class at P.S. 49. Twenty-two students and a paraprofessional were present for a lesson based on different kinds of hats and the use of prepositions such as forward, up, down, and above. The teacher began the class by trying on a variety of hats. She then called on volunteers to describe the hats (shape, color) and to guess the professions in which they were used. The teacher read the story *Whose Hat?* to the students and introduced vocabulary words. The students reviewed vocabulary by acting out a song, *Got a Hat, Hat*. As a final part of the lesson, students made paper hats. The students were very alert and involved.

The evaluation objective for English development was:

- By June 1993, participating students will demonstrate significant English language gains in listening, speaking, reading, and writing, as shown by gains of at least 5 N.C.E.s on the Language Assessment Battery (LAB).

There were complete pre- and posttest scores on the LAB for 202 students from grades one through five. (See Table 5.) Students showed a mean gain of 0.1 N.C.E.s, which was not significant and was lower than the previous year's gain of 6.1 N.C.E.s.

The project did not meet its E.S.L. objective.

TABLE 5

Pretest/Posttest N.C.E. Differences on the
Language Assessment Battery, by Site

Site	Total number of project students	Number of students for whom data were available	Pretest		Posttest		Difference		*t* value
			Mean	S.D.	Mean	S.D.	Mean	S.D.	
P.S. 49	115	101	19.8	14.1	20.8	16.9	1.0	14.0	0.74
P.S. 156	111	101	18.5	17.8	17.7	10.1	-0.8	15.6	-0.49
Total	226	202	19.1	16.0	19.3	14.0	0.1	14.9	0.13

- Students showed a mean gain at one site only. Neither this gain nor the overall mean gain was significant.

LEP Participants' Progress in Native Language

An OREA field consultant observed a second-grade N.L.A. reading class at P.S. 156 at which 13 students were present. The lesson was based on a story from the textbook. After reading the story, *El Globo Amarillo*, the teacher asked the students to write a brief letter about themselves and to draw a picture of an activity they enjoyed. They then placed their letters inside balloons. The students cooperated with one another in tying the balloons with strings. Finally, the balloons were released at lunchtime in the hope that they would be retrieved by someone, somewhere.

The students were involved in the lesson, which utilized their reading, writing, and communication skills as well as engaging their imaginations.

The evaluation objective for native language development was:

- By June 1993, participating students will demonstrate gains in Spanish Reading skills by showing significant pretest/posttest gains on El Examen de Lectura en Español (ELE).

The project provided OREA with complete pre- and posttest scores on the ELE for 77 students in grades three through five. Since the ELE is not administered to second grade students until the end of the school year, pre- and posttest scores were not available for them. The ELE is not given in first grade. (See Table 6.) Students showed a mean gain of 1.4 N.C.E.s. This gain was not statistically significant. Last year, students had showed a mean loss from pretest to posttest of -6.6 N.C.E.s, so this year's performance showed improvement.

Project BEAM did not meet its N.L.A. objective.

TABLE 6

Pretest/Posttest N.C.E. Differences on the
El Examen de Lectura en Español (ELE), by Site

Site	Total number of project students	Number of students for whom data were available	Pretest		Posttest		Difference		*t* value
			Mean	S.D.	Mean	S.D.	Mean	S.D.	
P.S. 49	115	45	42.9	17.6	42.7	18.1	-0.1	16.3	-0.05
P.S. 156	111	32	37.4	19.9	41.0	17.9	3.6	14.0	1.44
Total	226	77	40.6	18.6	42.0	17.9	1.4	15.4	0.80

- Students overall showed gains on the ELE, but these gains were not significant.

LEP Participants' Academic Achievement

Project BEAM students were enrolled in courses in mathematics (including architecture), science, and social studies. The project proposed objectives for mathematics only.

Teachers exposed students to mathematical concepts by providing them with hands-on activities in a stimulating learning environment. In early grades, students were introduced to lines (vertical, horizontal), structural entryways (doors, windows), and the use of numbers on scales and rulers. In higher grades, students were taught methods or styles of building as evidenced in the architectural projects they later completed. Other lessons were on architectural products, construction materials, and solving problems and postulating formulas for dimensions and volumes.

An OREA field consultant observed a bilingual (Spanish) fifth-grade architectural mathematics class of 25 students at P.S. 49. A paraprofessional was present to assist students individually when necessary. The students were completing the final part of their lesson on the building of pyramids, for which they had made models. They worked in pairs as the teacher and paraprofessional circulated, giving assistance and direction. On several occasions, the teacher stopped to recapitulate and reemphasize important features of Egyptian and Central and South American architecture. The teacher finished the lesson by reviewing the day's lesson.

The project's objective for mathematics skills development was:

- By June 1993, as a result of participating in the program, students will demonstrate achievement beyond expectation as shown by gains of at least 5 N.C.E.s on the MAT-Math.

MAT-Math pretest and CAT-Math posttest scores were available for 24 students in grades one through five. Overall, the gain from pretest to posttest was greater than the 5 N.C.E.s proposed. (See Table 7).

The project met its objective for gains of over 5 N.C.E.s in mathematics.

- By June 1993, 80 percent of the participating students will show knowledge and appreciation of various architectural concepts and techniques.

OREA used final course grades to measure achievement of this objective. Data were reported for 216 students; of this number, 212 (98.1 percent) showed knowledge and appreciation of various architectural concepts and techniques.

Project met its objective for knowledge and appreciation of architecture.

FORMER PARTICIPANTS' ACADEMIC PROGRESS IN ENGLISH LANGUAGE CLASSROOMS

One student was mainstreamed at the end of the school year previous to that under review. Project BEAM did not monitor this student's subsequent performance.

TABLE 7

Pretest/Posttest N.C.E. Differences on the
Metropolitan Achievement Test in Mathematics (MAT-Math) and
California Achievement Test (CAT), by Site

Site	Total number of project students	Number of students for whom data were available	Pretest		Posttest		Difference		*t* value
			Mean	S.D.	Mean	S.D.	Mean	S.D.	
P.S. 49	115	10	23.1	14.6	32.0	14.5	8.9	21.4	1.31
P.S. 156	111	14	22.4	13.5	26.9	13.0	4.5	11.0	1.53
Total	226	24	22.7	13.7	29.0	13.6	6.3	15.9	1.95

- Students showed pretest/posttest gains in mathematics at both sites.

OVERALL EDUCATIONAL PROGRESS ACHIEVED THROUGH PROJECT

Mainstreaming

The project did not mainstream any students this year.

Grade Retention

Project BEAM did not propose any objectives for grade retention. Four Project BEAM students (1.8 percent) were retained in grade this year. In the previous year, eight students (2.0 percent) were retained in grade.

Attendance

In an effort to promote better attendance, Project BEAM presented monthly awards for the highest grades in mathematics and science and issued monthly certificates for the top three students in each class. The project also coordinated a series of workshops at the Metropolitan Museum of Art and arranged exhibits of project students' art work at the district's office and at Hostos Community College.

The project had the following attendance objective:

- As a result of participating in the program, there will be a significant gain in student attendance.

For the year under review, the attendance rate at P.S. 49 was 93.2 percent. This represents a slight increase (0.7) over last year's 92.5 percent. At P.S. 156, attendance was lower by 4.4 percent (95.0 percent for 1991-92 and 90.6 for 1992-93). Students' attendance was good, but the significance called for in the objective is unattainable and warrants review.

The project did not meet its attendance objective.

Placement in Gifted and Talented Programs

No students were placed in specific programs for the gifted and talented. Such students did receive individual tutoring, however.

CASE HISTORY

C.P., a 10 year old fourth grader, was born in the Dominican Republic. She arrived in the United States in 1989 and was placed in a second grade bilingual class served by Project BEAM. In her first year, C.P. showed an eagerness to participate in class, although she was below level in mathematics and spoke only Spanish. By the end of the year, she had caught up with her classmates in mathematics, and the assignments she handed in were excellent. During E.S.L. instruction, she was quiet but receptive.

C.P. began using simple phrases in English the following year. She particularly enjoyed choral reading with her classmates. Her confidence and ability continued to increase throughout the year. Her art projects showed an understanding of the skills covered in class. Her socialization skills were apparent.

In the year under review, C.P.'s reading skills in English increased greatly. She was even confident enough to narrate a class play performed in English. Her writing skills in both Spanish and English also improved. She was able to maintain her grade level in mathematics, and she enjoyed talking about her art projects.

STAFF DEVELOPMENT OUTCOMES

The project proposed one objective for the use of architecture in English and Spanish reading instruction:

- Participating teachers will demonstrate a greater ability to use various forms of architecture in their E.S.L. and Spanish reading instruction.

In addition to monthly and weekly activities sponsored by the district office, teachers of participating students took part in periodic architectural workshops presented by the LEAP consultants. Participating teachers also coordinated their lessons with the resource teachers. Consequently, teachers were better able to use architectural concepts to stimulate students' interest and further develop their English and Spanish reading, writing, and listening skills.

Project met staff development objective for the use of architecture in instruction, as it had done the previous year.

- Sixty percent of program teachers will have enrolled in at least one university course each semester.

The project provided tuition assistance to staff. During the 1992-93 school year, four (30 percent) of the teachers attended university courses each semester. This objective may be unrealistic, because resource teachers and most participating teachers already had at least a master's degree.

Project did not meet objective for enrollment in university courses. Last year, the project also failed to meet this objective.

- Sixty percent of program teachers will have participated in teacher training workshops and conferences.

All Project BEAM teachers participated in districtwide staff development conferences and a number of on-site Project BEAM workshops. In addition, the project director sent informal letters to disseminate information to teachers about materials, activities, curricula, etcetera.

Project met objective for staff participation in workshops and conferences, as it had done last year.

CURRICULUM DEVELOPMENT OUTCOMES

- A draft of a manual containing learning activities and methods to be used for E.S.L./Spanish reading will be prepared by the participating staff and teachers.

Project staff and teachers drafted a curriculum guide for E.S.L./Spanish reading lessons based on architectural concepts.

Project met curriculum development objective, as it had done last year.

PARENTAL INVOLVEMENT OUTCOMES

- Sixty percent of the parents of participating students will have participated in program-related activities.

The project offered parents a wide variety of activities. These included workshops, meetings, field trips, and an art exhibit. Project attendance records indicated that over 60 percent of the parents participated.

Project met objective for parental involvement in program-related activities, as it had done last year.

- Sixty percent of the parents will have participated in E.S.L. and Spanish reading through architectural mathematics activities.

Project BEAM arranged classroom visits and organized a series of workshops on E.S.L. and Spanish reading activities for participating parents. Project records showed that over 60 percent of the parents participated.

Project met objective for parental involvement in E.S.L. and Spanish reading activities, as it had done last year.

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

ACHIEVEMENT OF OBJECTIVES

Project BEAM met its objectives for mathematics, curriculum development, knowledge and appreciation of architecture, and parental involvement. The project also met its staff development objectives for instructional use of architecture and for staff participation in workshops and conferences. The project did not meet its staff development objective for enrollment in university courses or its objectives for E.S.L., N.L.A., and attendance.

Participating students in Project BEAM showed academic progress at the end of the 1992-93 school year: of the 226 students involved in the project, 222 were promoted to the next grade. The students showed gains in English, Spanish reading, and mathematics, although they did not show increases on the LAB or ELE at the rate projected. The project director plans to place greater emphasis on peer tutoring and after-school enrichment programming, particularly as related to English and N.L.A.

Project services not only benefited the students academically but also increased their awareness of their own and other cultures. Teachers of participating students improved their teaching techniques after attending the project's workshops and training sessions with the architects. Parents of participants benefited from the broad array of activities that the project offered throughout the year.

MOST AND LEAST EFFECTIVE COMPONENTS

The project director felt that the use of outside consultants and parental activities were the most effective components of Project BEAM. Quantitative data and reports of observers and those involved in the program attest to the strength shown in these areas. The use of architectural consultants was so successful that the project director has been requested to make greater use of them next year.

Least effective components of Project BEAM were E.S.L. and N.L.A. Although observations of E.S.L. and N.L.A classrooms indicated lively discussions and genuine interest, additional effort will have to be made in these areas.

RECOMMENDATIONS TO ENHANCE PROJECT EFFECTIVENESS

- Assess reasons for the lack of growth in participant's English language skills. Consider offering intensive E.S.L. at the literacy level, particularly for recent immigrants.
- Explore additional techniques to increase students' acquisition of skills in mathematics and N.L.A., possibly by expanding peer tutoring and enrichment programming.
- Review the attendance objective. Consider requesting modification of the objective so that a comparison between and mainstream students is made.
- Encourage project teachers to enroll in university courses.

APPENDIX A

Instructional Materials

E.S.L.

Grade	Title	Author	Publisher	Date of Publication
1-6	BEAM Curriculum Guide	Project BEAM Teacher	C.S.D. 7	1991
1-6	E.S.L. Activity Kit	E. Claire	Prentice Hall	1989
K-6	Individual Reader		Troll Assoc.	*
*	Where the Wild Things Are	Maurice Sendak	Harper & Row	1963
1-6	Architectural series	D. MacCauly	Houghton/Mifflin	1976
*	Addison Wesley E.S.L.	Michael Walker	Addison Wesley	1989
*	Open the Light	Coreen Carruthers	Addison Wesley	1982
*	Complete E.S.L. Resource Book	*	National Textbooks	1988

N.L.A.

Grade	Title	Author	Publisher	Date of Publication
1-6	BEAM Curriculum Guide	Project BEAM	C.S.D. 7	1991
1-6	Individual Reader	*	Modern Curriculum Press	*
1-6	Mil Maravillas	Spanish Reading Series	Macmillan Publishing Co.	1987
1-6	Campanitas de Oro	Spanish Big Books	Lectorum Publishing Co.	1988
1-6	Spanish Reading Series	*	Houghton/Mifflin	1989

*Information not supplied.

APPENDIX A

Instructional Materials, cont'd.

Content Area Subjects

Grade	Title	Author	Publisher	Date of Publication
2-6	BEAM Manuals	Project BEAM	C.S.D. 7	1991-92
3-6	Mathematics	*	CMS	1990
3-6	Mathematics	*	Holt	1990
6	Ciencias	*	Silver Burdett	*
*	Ciencias	*	Holt, Rinehart & Winston	*

*Information not supplied.

APPENDIX B

Class Schedules

Second Grade

Days	Period	Subject
M-F	8:45 - 9:30	Reading
M-F	9:30 - 10:15	Mathematics SIMS
L U N C H		
M-F	11:00 -12:00	Recreation/Lab
M-F	12:00 -12:45	E.S.L
M-F	12:45 - 1:30	Science
M-F	1:30 - 2:15	Social Studies
M-F	2:15 - 2:55	Arts/Architecture

Fifth Grade

Days	Period	Subject
M-F	8:45 - 9:30	Reading
M-F	9:30 - 10:15	Science
M-F	10:15 - 11:00	Mathematics SIMS
M-F	11:00 - 11:45	E.S.L
M-F	11:45 - 12:20	Physical Education
L U N C H		
M-F	1:00 - 1:40	Social Studies
M-F	1:40 - 2:15	Lab
M-F	2:15 - 2:55	Arts/Architecture